

New Method for Calibration for Hyperspectral Pushbroom Imaging Systems*

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Abstract

A new, easy-to-implement approach for achieving highly accurate spectral and radiometric calibration of array-based, hyperspectral pushbroom imagers is presented in this paper. The equivalence of the plane of the exit port of an integrating sphere to a Lambertian surface is utilized to provide a field-filling radiance source for the imager. Several different continuous wave lasers of various wavelengths and a quartz-tungsten-halogen lamp internally illuminate the sphere. The imager is positioned to "stare" into the port, and the resultant data cube is analyzed to determine wavelength calibrations, spectral widths of channels, radiometric characteristics, and signal-to-noise ratio, as well as an estimate of signal-to-noise performance in the field. The "smile" (geometric distortion of spectra) of the system can be quickly ascertained using this method. As the price and availability of solid state laser sources improve, this technique could gain wide acceptance.

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